Crop yield among smallholder farmers is declining due to climate change impacts. A case study of maize (Zea mays L.) cropping systems in Kiha watershed, Albert Graben.

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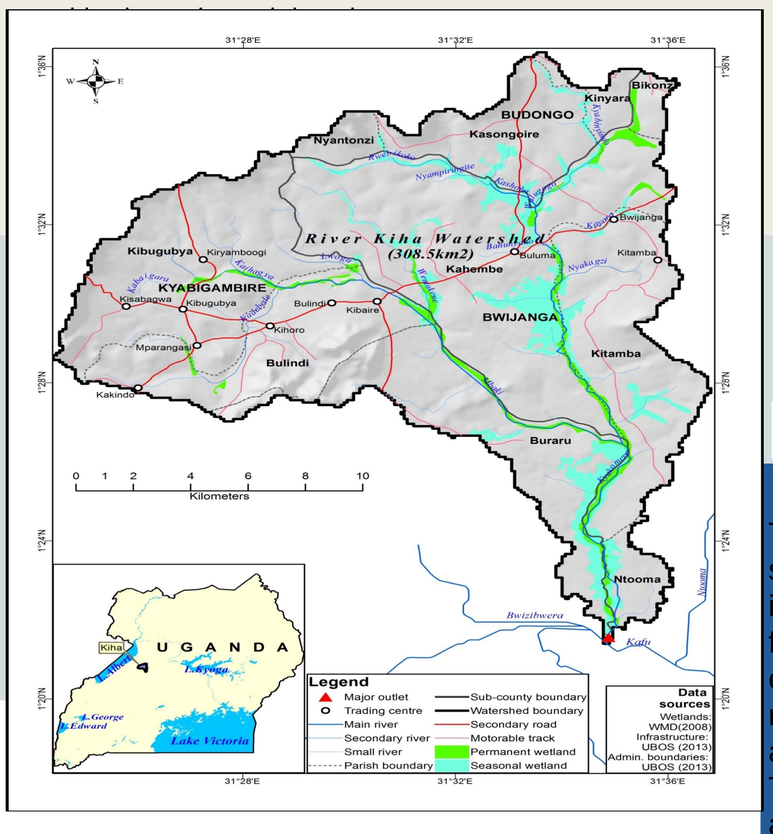
Background

- Crop yield among smallholder farmers is declining due to climate change impacts.
- Climate smart practices have a potential to adapt to climate change impacts and increase yield production to a greater and more sustainable levels among the smallholder farmers.
- Maize is an important staple food crop in sub-Saharan Africa and its production needs to be increased to meet the increasing demand.
- Climate Smart Agricultural Practices (CSAs) are known to foster adaptation and provide opportunities to improve the decreasing yield and seasonal yield variability. Hence they can be recommended for adaption in the study area

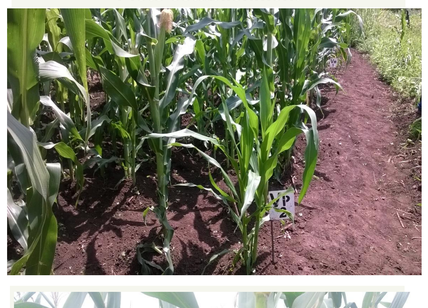
Methodology

- The study was conducted in Kiha catchment-Hoima district located in the Albertine region (Figure 1), The district straddles Lake Albert bordering Uganda and DRC. It is a district located in the western Mid-Altitude Farmlands and Semliki Flats (MAFSF) Agro-ecological zone (Wortmann and Eledu, 1999).
- Selected climate adaptation practices identified by smallholder farmers included; (mulching, farm yard manure and fertilizer application) under Maize *(Zea mays L.)* cropping systems in Kiha watershed.
- Surveys were conducted among smallholder farmers (143 respondents) using structured questionnaires and two seasonal observations in field experiments setup up using a Complete Randomized Design (CRD) for the selected adaptation practices.
- Seasonal soil samples were collected before and after the experiment for nutrient analysis using standard laboratory procedures.
- Seasonal Maize physiological plant characteristics are observed and different growth parameters are collected across the treatments (mulching, farm yard manure and fertilizer application-DAP+Urea).
- This study was designed to experiment major climate smart agricultural practices selected by smallholder farmers which could be used as an alternative to increase seasonal crop yields

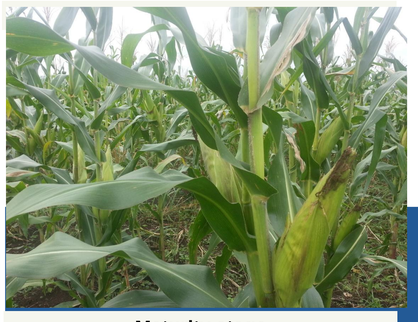


Plots establishment

Influence of CSA practices



Monitoring plant heights in maize



Maturity stage

Monitoring Maize harvest plants

Preliminary results

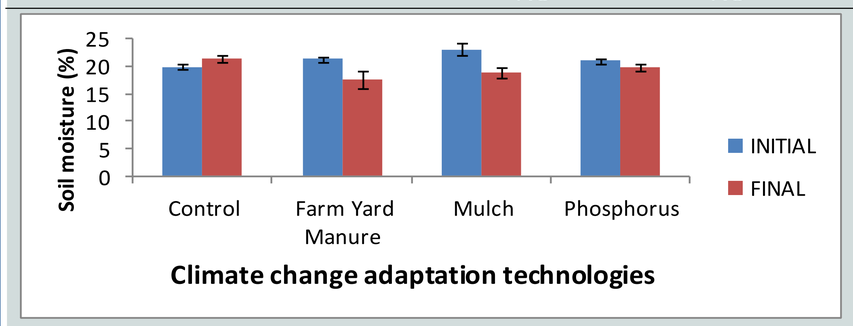
- Climate change adaptation practices did not have a significant effect (p≥0.05) on Grain and Stover yields.
- The results showed that, availability of moisture, seasonal yield output and the selected soil properties varied significantly (p<0.05) across the selected practices adopted by farmers.
- The two varieties differed significantly (p<0.05) in terms of Stover yield and Longe 9 had significantly higher grain yield (29.8%) than the local variety (p<0.05).
- The Stover yield for Longe 9 was higher than that of local variety by 15.2% though the difference was not significant (p≥0.05).

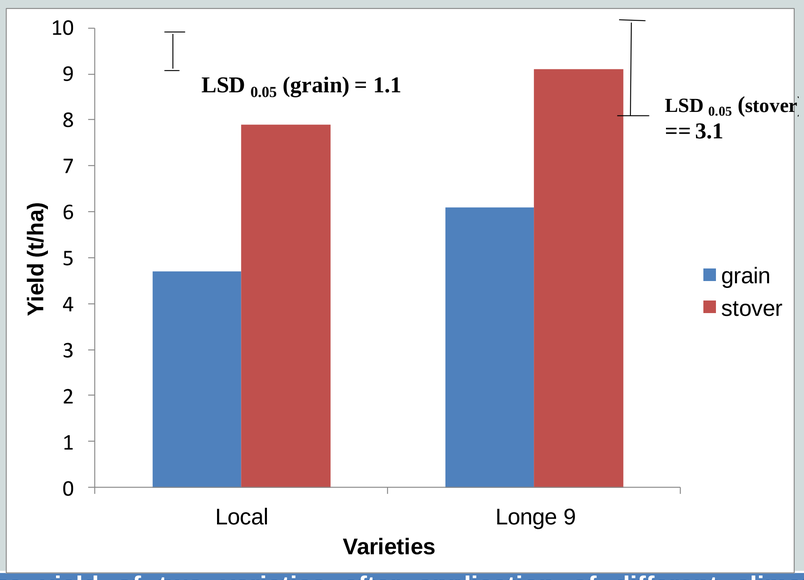
Objectives

- To identify major adaptation practices used by smallholder farmers in Albertine agro-ecological zone.
- To analyze the yield gap and variability under selected climate change adaptation practices in the maize cropping system.
- To identify the viable adaptation practices and evaluate the challenges and potentials for enhancing yield. By the end of the study.

Effects of selected climate adaptation practices on soil properties in the two maize varieties

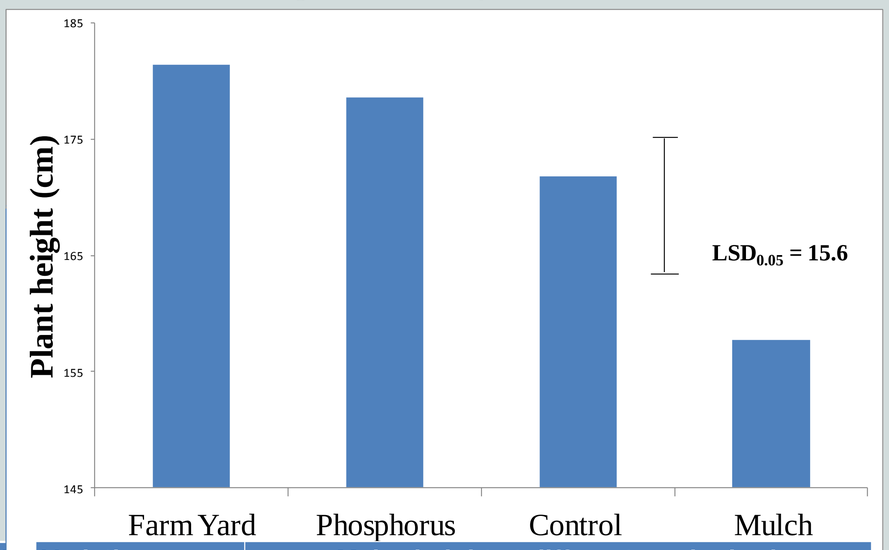
Variety	Treatments	% moisture	Bulk density
Local Variety (V1)	Control	20.36 ± 0.403[a]	1.138 ± 0.156
	DAP	21.34 ± 1.635[a]	1.113 ± 0.0469
	Farm Yard Manure	21.5 ± 0.833[a]	1.244 ± 0.0525
	Mulch	22.95 ± 1.283[ab]	1.241 ± 0.0172
Longe 9H (V2)	Control	19.6 ± 2.092[ac]	1.241 ± 0.131
	DAP	21.02± 2.118[ac]	1.198 ± 0.119
	Farm Yard Manure	21.06 ± 1.229[ad]	1.184 ± 0.0741
	Mulch	23.35± 4.215[ae]	1.177 ± 0.0324
Variety(p>0.05)		NS	NS
Treatments(p>0.05)		0.037	NS
Variety*Treatments(p>0.05)		NS	NS





Maize yield of two varieties after application of different climate change adaptation technologies

Effects on maize height across the practices



Varieties	Maize height at different weeks (cm)		
	10	12	14
Local	204.9	246.0	250.3
Longe 9	175.4	235.5	234.8
$LSD_{0.05}$	14.5	12.2	11.2
CV (%)	10.4	6.9	6.8

Conclusion

The study identifies the major adaptation practices from smallholder farmers in the Maize *(Zea mays L.)* cropping systems in Kiha watershed namely; (mulching, farm yard manure and fertilizer application). Although data collection is still ongoing to establish the yield gap, it has been observed from farmers' responses that selected climate change adaptation practices affect maize yield across the seasons in the Kiha catchment. Therefore continuous seasonal data collection on the studied adaptation practices is necessary to ascertain the actual yield variations across crop varieties, farm technologies and geographical locations.